Claims

We claim:

1   1. A method for transmitting an input stream of data symbols in a multiple-

2   input/multiple-output wireless communications system, comprising:

3   demultiplexing the input stream into M substreams;

4   adaptively modulating and coding each of the M substreams to a coded

5   substream;

6   space-time transmit diversity encoding a first of the M coded substreams into

7   two space-time transmit diversity encoded substreams, one space-time transmit

8   diversity encoded substream to be transmitted by a corresponding one of two

9   transmit antenna; and

10   transmitting directly each other coded substream by a corresponding single

11 transmit antenna.

1   2. The method of claim 1 further comprising:

2   feeding back, from a receiver, channel conditions of an associated channel

3   for each transmit antenna.

4   selecting a maximum data rate and a modulation for each substream based

5   on the channel conditions.

1   3. The method of claim 2, in which the channel conditions measure a signal to

2   interference plus noise ratio of the output streams received in the receiver.

1   4. The method of claim 1, in which the adaptive modulating and coding, further

2   comprises:

3   coding each substream;

4   interleaving each coded substream; and

5   symbol mapping each interleaved substream.

1   5. The method of claim 1, further comprising:

2   demultiplexing each output stream into a plurality demultiplexed output

3   streams;

4   multiplying each of the plurality of demultiplexed output streams by an

5   orthogonal variable spreading factor;

6   adding the demultiplexed output streams, for each ouput stream, after

7   multiplication into a summed output stream corresponding to each output stream;

8   and

9   multiplying each summed output stream by a scrambling code.

1   6. The method of claim 1, further comprising:

2   space-time transmit diversity encoding each of a subset of the M coded

3   substreams into two space-time transmit diversity encoded substreams, one space-

4   time transmit diversity encoded substream to be transmitted by a corresponding

5   one of two transmit antenna; and

6   transmitting directly each other of the M coded substream not included in the

7   subset by a corresponding single transmit antenna.

1   7. The method of claim 2, further comprising:

2   selecting the number M of substreams based on the channel condition.

1   8. An apparatus for transmitting an input stream of data symbols in a multiple-

2   input/multiple-output wireless communications system, comprising:

3       $M+1$ transmit antennas;

4   a demultiplexer configured to demultiplex the input stream into M

5   substreams;

6   M means for adaptively modulating and coding each of the M substreams to

7   a coded substream;

8   means for space-time transmit diversity encoding a first of the M coded

9   substreams into two space-time transmit diversity encoded substreams, one space-

10   time transmit diversity encoded substream to be transmitted by a corresponding

11   one of two transmit antenna; and

12   means for transmitting directly each other M-1 coded substream by a

13   corresponding single transmit antenna.